

BLACK & VEATCH**ESTIMATE PLAN AND BASIS****BUSINESS UNIT:** Energy**PROJECT AND PHASE:** 168908.2070**CLIENT:** LG&E/KU**LOCATION:** Carroll County, Kentucky**NAME OF PROJECT:** LG&E / KU – Ghent Station Phase II Air Quality Control Study**BRIEF DESCRIPTION OF PROJECT SCOPE:**

The cost estimates are provided as budgetary estimates for LG&E / KU – Ghent Station Units 1 - 4 AQCS Retrofit as follows:

- Unit 1 - Pulse Jet Fabric Filter (PJFF), PAC injection, and neural networks (NN)
- Unit 2 – PJFF, SCR, PAC injection, sorbent injection, and NN
- Unit 3 – PJFF, PAC injection, and NN
- Unit 4 – PJFF, PAC injection, and NN
- Common Estimate – Reserve Aux Power and Site Fire protection

Purpose

The purpose of the estimate is to provide LG&E/KU (Owner) sufficient confidence in the costs for use as a budgetary estimate. The desired accuracy range is expected so that the final cost will be within -15% to + 25% of the estimate after applying contingency. Estimates are based on Overnight costs.

B&V Project Team

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Estimate Methodology

This is a budgetary capital cost estimate that involves the use of multiple methods in development of quantities and pricing.

- Major equipment costs may be used in some areas as a basis for application of B&V standard multipliers in the development of costs for bulk or balance of plant pricing for items such as electrical raceway, piping, valves, and civil work, within the battery limits of the equipment.
- Quantities or allowances based on other recent and similar B&V projects may also be used where preliminary design quantities are not available.
- Equipment lists were used to populate the estimate.
- Quotes (Vendor budgetary) were provided for portions of the estimate. The quotes were conditioned or equalized for reasonableness as needed to reflect current designs, and then incorporated into the estimate.
- Estimated bills of quantities based on the conceptual design were developed for portions of the civil/structural work, including foundations, ductwork, and superstructures.
- Bulk quantities were priced using recent similar projects prices or B&V internal database.
- Construction Management is based on a factor of construction direct craft man-hours and reviewing other projects when available.
- Labor productivity factors are included with considerations for retrofit difficulties, working within an existing operating plant, availability of skilled labor, and plant outage constraints.
- Labor man-hours are based on 50 hour work weeks.
- Prevailing wage rates (best rate) for all crafts except Boilermakers, which are union wages, are utilized in the estimate. Prevailing wages for Boilermakers were not published for this area.
- A per diem rate was added to the craft wage rate based on a labor survey, which included an analysis of the availability of skilled labor and potential projects with concurrent schedules.
- Engineering costs are developed using similar projects and including site specifics of this project.
- Construction costs are based on an Engineering, Procurement, and Construction (EPC) contracting philosophy. Estimates are based on one EPC contractor for all four units.

Estimate Deliverables

Client copy will consist of specification level summary.

Units of Measure

The type of units of measure will be imperial.

Currency and Exchange Rates

The currency to be used will be US Dollars \$USD. The exchange rates for foreign purchases will be documented.

Equipment Pricing

Major equipment costs will be based on budget quotes and the remaining equipment costs will use in-house pricing. Freight and vendor representatives for construction (technical assistance), commissioning and start-up must be included.

Construction Power

Estimate assumes construction power to be available within the site boundary for distribution as required.

Construction Lay-down

Estimate assumes the site will have sufficient area available for construction activities for offices, lay-down and staging within ½ mile of the work area.

Demolition / Removal

Demolition / removal cost estimates will be based on demolition and off-site disposal. Scope of work does not require removal and reuse of existing equipment or structures. Demolition scope of work includes the following:

- Unit 1 – No Demolition required.
- Unit 2 – Demolition of the Unit 3 WFGD high voltage line and transformers and the ductwork and support steel downstream of the air heaters for installation of bypass.
- Unit 3 – Demolition of Maintenance Shop, ground level walkway (partially), skywalk, ID fans and associated ductwork. (Ground level walkway and skywalk are to be reestablished).
- Unit 4 – Demolition of ID Fans and associated ductwork and Warehouse (replaced by new warehouse erected at new location).
- Common – No Demolition required.

List of major equipment:

Common

- AQCS 13.8kV / 4.16kV Common Reserve Aux Power Transformers
- Fire Protection including 1 – 300,000 gal. fire water storage tank and 1 – enclosure with fire water pump

Unit 1

- Booster Fans (2 x 50%) and VFDs and Enclosure
- Pulse Jet Fabric Filters (2 x 50% assumed)
- PAC Injection System
- Neural Network
- AQCS 4.16 KV Auxiliary Power

Unit 2

- SCR System with Ammonia Injection
- Economizer Gas-Side Bypass System
- Booster Fans (2 x 50%) and VFDs and Enclosure
- Pulse Jet Fabric Filters (2 x 50% assumed)
- Sorbent Injection System
- PAC Injection System
- Neural Network
- AQCS 4.16 KV Auxiliary Power

Unit 3

- ID Fans (4 x 25%) and VFDs and Enclosure
- PAC Injection System
- Pulse Jet Fabric Filters (2 x 50% assumed)

- Fly Ash Transfer System
- Neural Network
- AQCS 13.8 kV Auxiliary Power

Unit 4

- ID Fans (4 x 25%) and VFDs and Enclosure
- PAC Injection System
- Pulse Jet Fabric Filters (2 x 50% assumed)
- Neural Network
- AQCS 13.8 kV Auxiliary Power

Estimate Inclusions:

- Other equipment modifications and tie-ins as required for the AQCS retrofit.
- Labor productivity factors.
- Fully burdened labor rates.
- Construction Management and Construction Indirects.
- Construction Indirects include the following:
 - Local Staff
 - Field Office Expenses
 - Temporary Facilities
 - Temporary Utilities
 - Heavy Haul
 - Heavy equipment
 - Small Tools and Consumables
 - Site Services
 - Safety
 - Pre-operational start-up and testing
 - Twelve (12) months Warranty Administration
 - Sub-contractor's profit
 - EPC fee.
- Addition of a new permanent frac tank included with the installation of Unit 3 PJFF.
- Addition of a remote truck unloading station for existing Unit 3 sorbent silos included with the installation of the Unit 3 PJFF
- Addition of a new (replacement) maintenance shop to replace that demolished included with the installation of the Unit 3 PJFF
- Reestablishment of the existing ground level walkway and skywalk between Units 2 and 3 included with the installation of the Unit 3 PJFF
- Addition of a new (replacement) warehouse to replace that demolished included with the installation of the Unit 4 PJFF
- Sales tax at 6% of indirect materials and services for Construction Management local staff, field office expenses, temporary facilities, fuels and oil, site services materials, safety materials.
- Builder's risk and general liability insurance.
- Performance bond.
- Engineering.

- Contingency
- Start- up spares
- Labor and material costs resulting from underground interferences for each unit is included as follows: Units 1 & 2 \$10,000 each, Unit 3 \$115,000, Unit 4, \$105,000.

Estimate Exclusions:

- Testing for environmental hazards including remediation, removal or disposal of but not limited to: asbestos, lead paint, underground contamination, PCBs.
- Work diversions from unplanned outages.
- O&M costs (provided separately. Refer to O&M Costs 41.0805.1).
- Salvaging, storage, or re-sale of equipment and materials.
- Scrap values are not included.
- De-energizing, draining, and tagging out plant systems.
- Upgrade or repairs to off-site roads and bridges.
- Boiler stiffening for any of the units is not included.
- Escalation.
- Sales tax for direct equipment and bulk commodities. Method for calculating tax for those items will be determined by LG&E / KU at a later date.
- Owner's costs to be developed by LG&E/KU.
- Temporary facilities for the Owner.
- Construction / contractor's permits.
- Operating Spares

Estimate Clarifications:

- Owner will supply Operators to support initial equipment operation through tuning of the AQCS equipment.
- Vendor Terms and Agreements will provide Commissioning support on the Fans, Fabric Filters, and SCR equipment as necessary and appropriate.
- Each Power Distribution Center (PDC) has been assumed to be \$500 per square foot. The price per square foot includes HVAC, lighting, installation of the gear and wiring to DCS I/O cabinets in the PDC. \$500 per square foot is based on the West County Unit 3 pricing, a project that purchased PDC in the last 24 months. **The price does not include shipping.**
- It has been assumed that the existing 25 kV switchgear that will supply primary side power to the Common Reserve Auxiliary Transformers has adequate capacity to allow the expansion of the switchgear. A study will be required to confirm.
- It has been assumed that a ductbank for the 25 kV cable which will run from the expansion of the existing 25 KV switchgear to the Common Reserve Aux Transformers will not encounter any obstructions that will impact the cost of the ductbank.
- It has been assumed that there will be adequate space available to add new cable bus, cable tray, and conduits to existing pipe rack.
- It is assumed that existing structures have enough reserve capacity to accept the cable tray, conduit, and cable bus loads.

- Pricing information for the mobilization of the crew to tap into the isolated phase bus duct (IPB) is based on a Calvert proposal to tap into the IPB at West County Unit 3. This proposal is less than 24 months old.
- It is assumed that a grounding study will be done during detail design and that the new grounding can be tied into the existing mat as required by the grounding study.

Attachments:

- Request for Cost Estimate Clarifications (1/24/11 Rev. 1)

REPORT LIMITATIONS

This report was prepared for LG&E/KU (Client) by Black & Veatch Corporation (B&V) and is based on information not within the control of B&V. While it is believed that the information, data, and opinions contained herein will be reliable under the conditions and subject to the limitations set forth in this report, B&V does not guarantee the accuracy thereof. Since B&V has no direct control over the cost of labor, materials, or equipment furnished by others, or over the resources provided by others to meet project schedules; as a result, B&V's opinions of probable costs and project schedules for work are based on the collective experiences and qualifications of its construction managers and professional engineers. B&V cannot guarantee that actual project costs will not vary from this cost estimate or that actual schedules will not vary from the projected schedules. B&V has assumed that the information provided by others, both verbal and written, is complete and correct and has not independently verified this information.

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LG&E/KU Mill Creek, Ghent, and Brown AQC Budgetary Cost Estimates

Request for Cost Estimate Clarifications: 1/24/11. rev. 1

Please provide your responses to the questions listed below. Clarification of these items will help ensure the development of an accurate cost estimate.

1. Does LG&E/KU want the cost estimates based on Union or Open shop labor?
Agreed direction: B&V estimate will use best value labor in development of capital cost estimates.
2. Contracting Strategy: Should the cost estimate be based on EPC (Engineering, Procurement and Construction) or Multiple subcontracts to be administered by LG&E/KU?
Agreed direction: Cost estimate will be based on EPC philosophy.
3. Contingency. Does LG&E/KU want contingency included in the cost estimate? This contingency is for the direct capital cost unknowns such as labor, materials and indirect costs.
Agreed Direction: B&V will include contingency in the cost estimate and identify the assumed percentage and basis in the report.
4. Is sales tax on materials and services to be included? If so, at what rate?
Agreed direction: B&V will include a 6% sales tax on indirect material and services costs. Direct materials are exempt.
5. Is the estimate to include insurance premiums for builder's risk and general liability (CSIP, OSIP)?
Agreed direction: B&V will include in EPC estimates.
6. Is the cost of a Performance Bond, including work estimated as a subcontract, to be included in the estimate?
Agreed direction: B&V will include in EPC estimates.
7. Is the cost estimate to be based on "Overnight costs" (current day March 2011 dollars) or is escalation to be applied?
Agreed direction: Estimates will be based on Overnight costs.
8. Please identify the scope of LG&E/KU supplied services for construction indirects such as construction trailers, construction water, sewer, electrical power, telephone, internet connection. Is the cost for any of the utilities to be included in the estimate?
Agreed direction: Construction indirects will be included as line items in cost estimates.

9. Owner's costs. Please provide a list of Owner's costs that are to be included in the cost estimates. Or, confirm if Owner's costs should be based on a percentage of the total capital cost estimates and if that percentage will be provided by LG&E/KU or as developed by B&V.

Agreed direction: LG&E/KU will be responsible for estimating Owner's costs.

10. If the construction execution solution is multiple subcontracts, will Construction Management (CM) be by LG&E/KU? Do CM costs need to be included in the estimate?

Agreed direction: N/A, as execution solution is EPC (see second question regarding contracting strategy).

11. What will LG&E/KU's role in startup be? Hand's off? Supply operators only, etc?

Agreed direction: Commissioning costs will be included in EPC estimate.

12. Demolition/Removal

Agreed direction: Demolition/removal cost estimates will be based on demolition and off-site disposal. Scope of work does not require removal and reuse of existing equipment or structures.